VRKSHAYURVEDA
Ayurveda for Plants

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Preface

It is now nearly ten years since our centre has started looking into literature pertaining to *Vrkshayurveda* i.e., *Ayurveda* for plants. After some encouraging results with initial experiments for the first few years, we had wanted to undertake an effort to look into the applications of *vrkshayurveda* for rice which is the major crop of Tamil Nadu and one of the major crops of India. When we discussed this possibility with the Department of Science and Technology in 1996, Dr. C.J. Johnny (Head, Science and Society Division) was quite encouraging in his response and invited us to formulate a proposal for looking at the relevance of *vrkshayurveda* based techniques for major pest problems of the rice crop and for growth promotion. This book is a result of literature search, laboratory experiments and field trials that have been carried out as part of this DST supported programme during the last two years.

This book provides an introduction to the literature on *vrkshayurveda* and the understanding of the constitution of plants, causes of and line of treatment for diseases as described in *vrkshayurveda*. This is followed by sections where we have shared our experiences of testing recipes based on *vrkshayurveda* as well as analysis of farmer's practices. We feel that not only does the literature of *vrkshayurveda* contain a lot of information and prescriptions of great value but also that the line of thinking based on *vrkshayurveda* would be very valuable in understanding and assessing farmer's practices.

We are thankful to a large number of farmers from our field area in the Kattankulathur block of Kanchipuram district of Tamil Nadu who participated in these efforts as well as other farmers such as Mr. Gomathinayakam and Mr. Antonyswamy of Puliankudi who have shared their

experiences with us. We are also thankful to Dr. K. Natarajan of Kodumudi, Erode District for experimentation with *panchagavya* and propagating it widely amongst farmers. His modified recipe of *panchagavya* is quite popular amongst farmers of Tamil Nadu.

We are thankful to A.M.M. Murugappa Chettiar Research Centre, Taramani, Chennai for providing us lab and experimental space at their campus for this project. The valuable assistance of Mr. K. Subramanian, Mr. N. Jaya shankar and Mr. G. Neelamegam with the field experiments is also thankfully acknowledged. Our thanks are also due to Mr. K.S. Sudhakar for research assistance.

We hope that all these efforts would lead to a new interest in exploring the current relevance and applications of *vrkshayurveda*.

1st August 2001 A.V. Balasubramanian
Chennai

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Chapter – 1

Introduction

India is the repository of one of the richest biogenetic resources in the world. Our countrymen have traditionally shown a remarkable awareness and knowledge of its varied flora and have in addition put it to diverse uses. In ancient India there was a tradition of classifying and grouping arts and crafts and knowledge into various categories known as *sastras* or *kalas*. Sage Vatsyayana, for example, in his famous text Kama Sutra, listed 64 *kalas* which is considered a standard list.

There are several such lists available and in these lists, along with subjects such as medicine or agriculture, there are various other sastras listed that bear a relation to plants, such as :

- *Vrkshayurveda yoga* Treatment for plants.
- *Buruhaanaam dohada* The art of grafting trees.
- *Vrksharohanam* Growth of trees.
- *Pushparthoranam* Decorations with flowers, etc.,

Understanding Plant Life

Throughout ancient literature of plant life we find theories about the evolution of plants, about the nature of plant life and the position of plants in the whole scheme of nature. Many references are available in these ancient texts to vegetation, features or habitats of plants, and their uses in varied areas of life. In India we have always treated plants as systems that have a direct or indirect bearing on the social, economic and political life.

Plants formed a distinct component of the immediate environment of the vedic Indians. They made utensils, weapons, agricultural implements, musical instruments and practiced medicine using plant parts. The need to use plants for various human requirements probably gave rise to the study of plants. *Charaka Samhitha* defines a physician as one who is well acquainted with the names and external features of plants and able to use them properly according to their properties.

In India, knowledge regarding plants was not merely at the level of identification of plants and their specific uses. Quite often traditional communities possess knowledge which suggests a deep understanding of the relationship of plants with other plants and animals, soil moisture and temperature and to other geological phenomena.

For instance, the distinguished Indian meteorologist Prof. P.R. Pisharoty has cited an example about folk knowledge of weather forecasting that throws light on people's knowledge of plants. In Kerala, farmers observe the flowering behaviour of a plant called 'Karmikaram' *(Xanthophyllum arnottianum)* that gives an indication of the date of onset of rains over six weeks before the event. The flowering depends on a combination of temperature and soil moisture over a period of time and this has been very carefully observed and made use of in forecasting rain.

Prof. E.A.V. Prasad, a distinguished geologist, who has been specialising in the area of hydrology and water detection for several decades has made a detailed study of the geological and biological indicators for the presence of ground water. These were described in the classic compendium of Sage Varahamira called *"Brihat Samhitha"* (literally meaning the "Master Compendium"). Prof. Prasad has found that many of the indicators described by Varahamira are valid even today and he has successfully employed them for prospecting for water in drought-prone regions of the country. Many of these techniques indicate an intensive knowledge of varied aspects of plant life and its relation with zoological and geological phenomena. (Two such water indicators are a ficus tree growing together with a palm tree and unusual pattern of branching in a palm tree).

Source Material for Vrkshayurveda

In general the word *vrkshayurveda* (literally meaning the "*Ayurveda* for plants") is used to denote knowledge of plant life in all its varied aspects.

In *Varahamithira's Brihat Samhitha* as well as in the *Agni Purana* there are separate sections dealing with *vrkshayurveda*. The very same term with the word *gulma* preceding it – *Gulmavrkshayurveda* occurs in *Kautilya's Arthasastra* listing the functions of the officer in charge of

agriculture, and his assistants. The three works in which this term is used and a complete section has been devoted to the subject, are not texts which are devoted to *vrkshayurveda* completely.

The first text *Agni Purana,* is a popular encyclopaedia of all kinds of knowledge and practices; the second, the *Brihat Samhitha* is a manual containing directions for the applications of the knowledge of astronomy and astrology in practice; the third, the *Arthasastra*, is a handbook discussing matters relating to royal polity and the art of government. Thus, all of them are non-botanical treatises; they are intended not so much to acquaint the students with theories as with practices. In all three, we can see an exclusive section dealing with "*vrkshayurveda*". Matters dealt with in these sections are same.

Besides these texts there are texts like *Upavana vinoda, Krishisukthi, Krishiparasara, Vrkshayurveda of surapala* which deal exclusively with different aspects of *vrkshayurveda*. Detailed information about these texts are provided in Appendix-1.

Scope of Vrkshayurveda

Vrkshayurveda is of great relevance in agriculture, horticulture and life sciences. It encompasses areas such as collection, selection and storage of seeds; germination, sowing, various techniques of plant propagation, grafting, nursing and irrigation; testing and classification of soil and selection of soil suitable for various plants/types of plants; manuring; pest and disease management/preventive and promotive care to build up disease resistance and to cultivate healthy plants; nomenclature, taxonomy, description and classification of plants to suit varied purposes; favourable and unfavourable meteorological conditions for various operations related to cultivation (such as sowing, harvesting) and use of plants as indicators of weather, water, minerals, etc.

In today's scenario the importance of understanding *vrkshayurveda* has also increased because several crores are being spent every year on pesticides to control pests. Apart from being costly the chemcial pesticides have proven to be environmentally disastrous. A detailed study of *vrkshayurveda* would also provide us with information on pest management based on sound ecological principles.

Since the knowledge of plant life is so vast, so is the scope of *vrkshayurveda*. In this user's manual on *vrkshayurveda* we would focus on certain aspects of plant nutrition and pest and disease management.

Plant Nutrition in Vrkshayurveda

In Sanskrit literature, we come across the word "*Dohada*" which means special treatment through manure or fertilizer. The importance of green manure prepared from the straw of Barley (*Hordeum vulgare*) and sesame (*Sesamum indicum*) and natural manure of animals like cowdung was recognized in increasing the productivity of the land. Kautilya's *Arthasastra* discusses the usefulness of cowdung and bones as manure.

The cultivators not only knew the use of manure in agriculture, but also possessed a fair knowledge of manufacturing it. Cowdung was stored in a pit specially dug for the purpose for a long period until it decomposed and transformed into manure.

Rules for watering plants have been laid out clearly in the texts of *vrkshayurveda*. There are also several recipes provided for the general nutrition of the plants. Specific recipes for increasing growth and yield for particular crops have also been provided. Preparation of special growth regulators and liquid manures like *kunapajala* are also dealt with in texts of

vrkshayurveda. Some of the recipes that have been experimented with are described in the third chapter.

Plant Disorders and their Management

Treating disorders in plants is dealt with in the extensive work *Brihatsamhitha* of Varahamihira as well as in *Agni purana*. There are a number of other works such as *Vrkshayurveda* of Surapala and *Lokopakara* which have a great wealth of information on treatment of plant disorders. To quote Gunaratna: "Just as the human body is subject to health problems, plants too suffer from similar problems such as displacement or dislocation of flower, fruit, leaves, bark and by application of appropriate remedies prescribed in *vrkshayurveda* unnatural growth, deterioration, wounds, fractures etc., can be cured in plants".

Texts of *vrkshayurveda* classify disorders in plants into two types – exogenous and endogenous. The endogenous disorders are caused by the disturbance of the three *doshas*, namely *vaatha, pitta* and *kapha*. The exogenous disorders are caused by factors such as pests, cold, hail, lightning, etc. According to *vrkshayurveda*, plants are also understood as having *vaatha, pitta* or *kapha* characteristics, like human beings. We should have an overview of this concept to understand disorders in plants.

Prakrithi or Constitution of Plants

Plants can be classified into three types based on their constitution. The broad classification is the same as the classification for human beings, namely *vaatha, pitta* and *kapha* constitution. The general characteristics of plants of each of these types are listed below.

Characteristics of Plants with *Vaatha* Constitution

- Slender and tall
- Light in weight
- Have a rough surface
- Their leaves wither or drop away with the slightest heat of the sun.

Characteristics of Plants with Pitta Constitution

- Are able to withstand bright light.
- Have weak branches which break away easily.
- Have abundant leaves and flowers.
- Bear fruits during off season.
- Are of medium size and height.

Characterisitcs of Plants with Kapha Constitution

- Possess stout and bulky stems and branches.
- Plenty of thick leaves.

Kapha Prakruthi

- Bear abundant flowers and fruits.
- House many creepers and climbers around them.

Rationale of Plant Prakrithi : A Comparison with the Human Constitution

According to *ayurveda, vaatha prakrithi* individuals possess a slender and tall body, are light in weight, have rough and dry skin with prominent (bony) joints and present an emaciated look. *Pitta prakrithi* individuals possess a medium-sized body with medium strength, have a tendency to early baldness and greying of the hair, possess yellow or copper coloured skin and have plenty of pimples and freckles on the skin. *Kapha prakrithi* individuals possess a short and bulky body with good strength and withstand stress better than the other two types of constitution. They adjust well with all types of people.

As in the case of humans, it is also true in the case of plants that single prakrithi type is very rare and what one normally encounters are combinations (eg.) *vaata-pitta type, pitta-kapha type, vaata-kapha* etc.,

Endogenous Disorders

Vaathaja Problems

Causes

Feeding plants excessively with substances that are dry and astringent vitiates *vaatha*. *Vaatha* is also vitiated during summer as a result of loss of moisture in the soil.

Note : For details regarding Ayurvedic properties(guna) of drugs refer Appendix - II.

Symptoms

Plants affected by *Vaathaja* diseases are lean, deformed, full of knots and globules on the leaves, rough, have low water content and exhibit a loss of sweetness.

Treatment

- Irrigation with flesh, fat, tallow and ghee could be done.
- Fumigation with neem, cow's horn, horse's hair, ghee, atis root and oil *(Aconitum heterophyllum),* pig's fat, wild asparagus (As*paragus racemosus)* and deodar *(Cedrus deodara)* could be attempted.

- The tumours and protuberances which develop on the sides of the trees due to *vaathaja* disorders could be plastered with cowdung, marking nut *(Semicarpus anacardium)* and fat and watered with carrion broth.
- An infusion of greater galangal (*Alpinia galanga*), winter cherry (*Withania somnifera*), mesua (*Mesua nagassarium*) and long pepper (*Piper longum*) is used to water the plants.
- If conditions are acute, the tree is watered with an infusion of fennel (*Foeniculum vulgare),* and dill *(Anethum graveolens*) seeds.
- Fumigation with the leaves of five-leaved chaste tree (*Vitex negundo*), Indian bdellium tree (*Commiphora mukul*), ghee and seeds of karumarudu *(Terminalia tomentosa)* is also done.
- Dressing of the roots with goat's excreta and oil cake is also beneficial.

Rationale

Therapy is done with ghee, fat, marrow, flesh, etc. for *vaathaja* disorders in human beings. The drugs administered should have the properties associated with them in *ayurveda*, i.e. be sweet, sour and salty in taste, hot in potency, etc. Infusion and poultices are also used to reduce the pain which is characteristic of *vaatha* dosha. The therapeutics is predominantly what is known as "bulk promoting". Drugs such as winter cherry (*Withania somnifera*), greater galangal (*Alpinia galanga*), marking nut tree (*Semicarpus anacardium*), fennel (*Foeniculum vulgare)* and five-leaved chaste tree (*Vitex negundo*), possess these qualities. Fennel (*Foeniculum vulgare)*, deodar (*Cedrus deodara)*, winter cherry (*Withania somnifera*), are also mentioned in Charaka for treatment of *vaathaja* disorders.

Pittaja Problems

If plants are irrigated with substances that are pungent, sour and saline it vitiates *pitta*. Plants are also prone to *pittaja* diseases in summer and autumn.

Symptoms

Yellowish discolouration of leaves, premature fruiting, oozing in fruits, emaciation due to excess activities of *pitta* and subsequent burning up of body elements, languor of leaves and flowers and fruits bearing a worn-out apperance, are the symptoms of *pittaja* diseases.

Treatment

- The plants should be irrigated with substances that are cooling and predominantly sweet in taste. Decoction of sweet liquorice (*Glycyrrhiza glabra*), mahua tree (*Madhuca indica*) and milk mixed with honey is used for irrigation.
- Decoction of triphala (*Terminalia bellerica, Terminalia chebula, Phyllanthus emblica*) mixed with ghee and honey is also recommended. The plants could be nurtured with cold and perfumed rose water in which sugar and embelia (*Embelia ribes*) has been dissolved.

- Fumigation with sugar, honey and ghee is also suggested.
- Treatment is also given with khas-khas grass (*Vettivera zizanioides*), nut grass (*Cyperus rotundus)*, honey, milk and ghee.

Rationale

For *pittaja* disorders the line of treatment is the use of drugs which are predominantly sweet, bitter and astringent in taste, cooling and those which are soft and viscous. Substances such as ghee, milk and butter are used extensively. Application of fumes from aromatic substances such as sandal (*Santalum album*), khas-khas grass (*Vettivera zizanioides)* etc. is also beneficial. All that is soft and cold in nature is recommended.

Kaphaja Problems

Causes

Irrigating plants excessively with substances that are sweet, unctuous, sour and cold, can cause *kapha* diseases. Plants are more susceptible to *kaphaja* diseases in winter and spring.

Symptoms

Deformity of leaves, slow maturing of fruits and less taste in fruits are the general symptoms of *kaphaja* diseases.

Treatment

- *Kaphaja* diseases must be pacified with decoctions that are pungent and hot in nature.

- A paste of sugar and mustard is applied at the root and then the plant is irrigated with water mixed with the ashes of *sesamum* sp.
- The mud and soil around the plant affected by *kaphaja* diseases is removed and replaced with dry and hard soil.
- Affected tree could be nurtured with tepid water.
- An infusion prepared from barks of parisah (*Ficus arnottiana*), pilklan, country fig (*Ficus racemosa*) and devil tree or biton bark (*Alstonia scholaris*), neem (*Azadirachta indica*), sweet flag (*Acorus calamus)*, nut grass *(Cyperus rotundus)* and rohitaka tree (*Aphanamixis polystachya)* is prescribed.
- Watering for seven days with decoction of yellow berried nightshade (*Solanum surratense*), sahacara (*Barleria prionitis*), neem (*Azadiracthta indica*), sweet flag (*Acorus calamus*), cutch tree (*Acacia catechu*), black catechu and rosha grass / rusa grass (*Cymbopogon martinii*) is recommended.
- The roots of affected trees should be dressed with oil cake of white mustard (*Brassica juncea*) and irrigated with water in which sesamum and ashes are dissolved.

Rationale

For treatment of *kaphaja* disorders substances possessing pungent, bitter and astringent taste are used. *Panchamoola* possesses these qualities and is specifically used in *kapha* and *vaatha* disorders [*Panchamoola* is a combination of five plants. They are the bael tree (*Aegle marmelos*), Indian trumpet tree (*Oroxylum indicum*), coomb teak (*Gmelina arborea*), trumpet flower tree (*Stereospermum colais*) and *agnimandam*]. Neem (*Azadirachta indica*) and devil tree *(Alstonia scholaris)* are mentioned in Sushrutha for treatment of *kaphaja* diseases.

Exogenous Disorders

Vrkshayurveda also discusses the treatment of a large number of exogenous disorders and their management. These disorders are of several kinds, such as those caused due to worm infestation, insect attack, trees affected by fire, hail, storm, cold winds, dried trees, cut and broken branches, trees struck by lightning, etc.,

Chapter - 2

Farmers Practices and Rationale from Vrkshayurveda

Introduction

There are several indigenous practices followed by our farmers in agriculture. Based on our work in *vrkshayurveda* we believe that the rationale of these practices can be explained well based on principles of *vrkshayurveda*. How important is the analysis of these practices by farmers and the understanding of their rationale in ayurvedic terms? From our experience we feel that it serves a very important purpose. Such an analysis lets us extend the scope and application of farmers' practices. For example, once we know that a treatment is effective because it regulates *vaatha*, it opens up the possibility of modifying, extending or enhancing the efficacy of treatment by trying out other substances or regimens that can regulate *vaatha*. We can also evolve treatments based on the properties of materials known from *vrkshayurveda* to new conditions or situations not described or dealt with by *vrkshayurveda*.

Use of Gigantic swallow wort (*Calatropis gigantea*)

Calatropis in irrigation channels

Farmers divert the harvested rain water of adjoining fields into the weed affected fields. Cut branches of *Calotropis* are kept at the entrance of the rain water channel. This practice minimizes weed population to a great extent if repeated for several times during rainy days.

For control of aphids in lucerne (***Medicago sativa***) farmers place freshly cut branches of ***Calotropis*** in the irrigation channel.

Calotropis for treatment of termites

Calotropis plant material (8-10 kg) is soaked in water for about twenty four hours and filtered. This liquid is poured on termite infested soil. The effectiveness is evaluated by placing pieces of wood at various points in the field. If the wood is not affected for one week then the treatment is considered effective.

Rationale

Calotropis is included in the *arkadi gana** of *Sushrutha* and *swedopaga* (sub-diaphoretic) *gana* of *Charaka*. It reduces *kapha* and *vaatha dosha,* is *teeksna* (penetrative, quick) in *guna* (quality), *thiktha* (bitter) in *rasa* (taste), *katu* (pungent) in *vipaaka* and is *krimighna* (anthelmenthic) as well as *vishagna* (anti-toxic) in property.

Use of Cactus milk for paddy pest control

Cactus milk is poured into the water inlets in the paddy field to keep away certain insects.

Note : * Refer Appendix-III on ayurvedic classification of drugs based on therapeutic action.

Rationale

The latex of cactus may have similar properties to that of common milk hedge *(Euphorbia ligularia)* which is very *teekshna* (penetrative, spreads quickly) and *ushna* (hot) in quality and also reduces *kapha dosha* and is purgative.

Use of Asafoetida

Asafoetida (*Ferula asafoetida*) is applied on the rotten portion of the bottlegourd and a fine bandage cloth is tied around it. The disease is cured in a week's time.

Asofoetida is also used to prevent flower and fruit dropping. Plants of the gourd family are root fed with asofoetida solution for this purpose.

Rationale

Asafoetida or hingu as it is called in Sanskrit, helps in correcting *vaatha* dosha in living systems. Since the process of transformation of flowers to fruits is governed by *vaatha* dosha, any imbalance in the functioning of this particular dosha will hamper the process and the flowers will wither away. The application of asafoetida near the root of the plant alleviates the imbalance and sets in motion the normal functioning of the system. It is customary in Indian households to use hing powder mixed with warm water or buttermilk to relieve *vaatha* problem in humans. It is also beneficial in relieving abdominal gas especially in children and old people. *Hingu* or asafoetida is *ushna* (hot) in *veerya* (potency), *katu* (pungent) in *rasa* (taste) and *vipaaka* and is *krimighna* (antihelminthic) in property.

Use of Oilseed Cakes

The oilseed cakes of castor (*Ricinus communis*), neem (*Azadirachta indica*), mustard (*Brassica juncea*) groundnut (*Arachis hypogea*) and indian beech (*Pongamia pinnata*) when incorporated into the soil have been found highly satisfactory

Treatment for Ash gourd

As a child I was very fond of gardening and at home we had a small kitchen garden. We had an ash gourd (*Benincasa hispida*) plant which had flowered profusely but not a single flower bore fruit and all the flowers withered away. An old man used to come home once in a while to help with gardening. During one of his visits I mentioned this to him. "Oh, it's very simple to treat this," he exclaimed and asked for a piece of asafoetida (*Ferula asafoetida*). He dug a pit near the root and put the asafoetida into it. Within two weeks I noticed that the flower did not wither anymore and found tiny fruits. To our amazement that year we had a bumper crop of more than 100 ash gourds from one single plant!

It was more than 15 years after this event when I started looking at the literature on *vrkshayurveda* that I was able to comprehend the rationale behind it.

K. Vijayalakhsmi

in controlling plant parasitic nematodes. They remained effective for over six months in the soil.

Rationale

According to *Vaidya*. Vilas M. Nanal of Pune, oil seed cakes are considered *rooksha* (dry) i.e., devoid of water or oil content and *ushna* (hot) in property which are diametrically opposite to that of the internal environment which harbours worms and parasites (*krimi*). Therefore all such substances which are *katu* (pungent), *thiktha* (bitter) or *kashaaya* (astringent) in *rasa* (taste) and is *rooksha* (dry), *teekshna* (quickly acting) *ushna* (hot) and *laghu* (light) would be effective in one way or the other in the management of pests. Similarly, substances having strong, unpleasant odours also act as a pest repellent.

Use of Malabar nut (*Adhathoda vasica*)

Farmers use *Adhathoda* as a manure, pesticide, fuel for water purification and for medicinal purposes. It is used as a hedge plant to prevent goats and other animals from entering the cultivated fields. It is also used around betel gardens to protect the creeper from hot winds. The leaves are used to cover wet seeds about to be sown for a second crop in order to induce sprouting. Leaves of *Adhathoda* are used by farmers to kill aquatic weeds which form thick floating mats and prevent tillering in rice fields.

In Nepal, the farmers use *Adhathoda* leaves as a manure in rice, potato and maize fields. The leaves are chopped and applied prior to planting where they decompose rapidly, within seven to ten days in summer. This controls termite infestation. Rice treated with *Adhathoda* leaves at the rate of ten tonnes of leaves per hectare yielded forty percent more than rice treated with equivalent amounts of chemical fertilizers.

Rationale

Adhathoda is *kashaaya* and *thiktha* (astringent and bitter) in *rasa* (taste), *katu* (pungent) in *vipaaka*; *ushna* (hot) in *veerya* (potency) and is a potent drug against phlegmatic diseases caused by *kapha dosha*.

Mixed Cropping with Hibiscus

Hibiscus cannabinus (*Nali*) seeds are sown with rice in upland dry rice fields for controlling termite attack. The red variety is considered better than the green variety.

Rationale

Hibiscus flower and leaves are used extensively in hair oils which is useful in conditions such as dandruff and skin disorders, due to their *krimighna* (antihelminthic) and *kaphagna* (reduces *Kapha dosha*) properties.

Cow Urine to control Pest of Fennel

Urine of cow is sprinkled on the fennel (***Foeniculum vulgare***) crop to minimise aphid infestation.

Rationale

Gomootra (Cow's urine) is *rooksha* (rough) and *teekshna* (penetrating) in *guna* (quality), *ushna* (hot) in *veerya* (potency), *katu* (pungent) in *rasa* (taste) and *vipaaka* and is *lavana* in *anurasa* (subserviant taste). It is *krimighna* (antihelminthic) in property. Cow dung (*karisa*) also has similar properties.

Chapter - 3

Vrkshayurveda for Paddy Cultivation

Introduction

This chapter provides information on certain tested recipes of *vrkshayurveda*. These experiments have been done on the paddy crop. We request our readers to read the entire booklet completely and exercise due care and precautions before taking up trials with the prescriptions mentioned in this book. Kindly bear the following factors in mind.

1. The field trials that we have reported in this book are largely on the paddy crop - if you are making trials with other crops they need to be tested out separately.

2. Even if you are making trials with the paddy crop kindly bear in mind that there may be variations in results due to factors such as -

   - the variety of paddy that is cultivated.
   - the crop season in which the test is carried out and
   - the climatic conditions prevailing in your area.

3. If you wish to test a recipe under your field conditions, it would be best to test it initially in a small experimental plot or even in paddy grown in pots. Please study the results that you obtain carefully and extend the trials to large or significant areas only after you have tested the results and find them satisfactory for at least two consecutive crop seasons.

NOTE : PLEASE ALSO GO THROUGH THE CONCLUDING CHAPTER BEFORE YOU INITIATE EXPERIMENTAL WORK.

1. Use of Cow's urine

a) Cow's urine for resistance to Leaf spot disease in paddy

Symptoms of the disease

The leaves show round to oval or irregular brown spots which may coalesce to cause withering of tissues. A velvetty growth may be seen on the glumes. Sometimes browning or greyish browning may be seen at the neck region. The grains show reddish brown discolouration. These spots are like sesamum seeds. Hence this is also called as sesamum leaf spot disease.

Treatment

Paddy seeds required for sowing in 1 acre of land should be taken. This would be roughly 35 kilos. These seeds should be soaked for two days in water and it should have sprouted. In fact, it should be ready for sowing in the nursery.

Take 1 liter of cow's urine and mix it with 5 litres of water. The cow's urine should be collected two days earlier. The paddy seeds which have already been soaked in water and sprouted should be soaked in the mixture of cow's urine and water. It should be soaked for half an hour. After this it should be taken out and shade dried for 15 minutes. It should then be sown in the nursery. This provides resistance to the crop from leaf spot disease.

Caution

Do not increase the quantity of cow's urine. This could decrease the germinating capacity.

b) Cow's urine for increasing yield

For spraying in one acre 6 litres of cow's urine is required. This cow's urine should be collected two days earlier. It should be mixed with 60 litres of water and sprayed. When this is sprayed during the vegetative stage the growth rate is increased and the crop also becomes resistant to diseases.

2. Use of Milk for resistance to Tungro virus

Symptoms of Tungro virus attack

Older leaves turn yellow orange starting from the tip and margin. Young leaves are mottled with pale green to whitish spots. Root development is poor and grains are usually covered with dark brown blotch. Plants become stunted and bear poor panicles with empty glumes. This disease is transmitted by green leaf hopper (*Nephotettix virescens*).

Treatment

Paddy seeds required for sowing in 1 acre of land should be taken. This would be roughly 35 kilos. These seeds should be soaked for two days in water and it should have sprouted. In fact, it should be ready for sowing in the nursery.

1 litre of milk should be mixed with 5 litres of water. It is better to use cow's milk. The paddy seeds soaked in water and sprouted should be soaked in this mixture of milk and water for half an hour. After this the seeds should be dried and then sown in the nursery.

Note

In Andhra Pradesh tobacco farmers dip their hands in milk before transplanting the seedlings of tobacco. It is an indigenous practice. This prevents the tobacco mosaic virus from attacking the tobacco seedlings.

3. Sweetflag (*Acorus calamus*) for general disease resistance and increasing germination

Paddy seeds required for sowing in 1 acre of land should be taken. This would be roughly 35 kilos. These seeds should be soaked for two days in water and it should have sprouted. In fact, it should be ready for sowing in the nursery.

Quarter kilo of sweet flag (*Acorus calamus*) should be powdered and soaked in 3 litres of water. This should be soaked overnight. Filter the extract next day. Take 1 litre of this extract and dilute it in 5 litres of water. Soak the sprouted paddy seeds in this extract for half an hour. Dry it in shade for 10 minutes before sowing. By this treatment the germinating capacity increases and also the plant becomes resistant to a wide variety of diseases.

4. Use of Mint in seed treatment for increasing crop growth and yield

The following is a recipe for increasing crop growth and yield. 200 grams of mint (*Mentha arvensis*) leaves should be mixed with water and ground well. To this 5 litres of water should be added. The sprouted paddy seeds should be soaked in this for half an hour. It should then be shade dried. After this it could be sown. This helps in increasing the crop growth and yield.

5. Growth regulator or Kunapajala for yield increase

Materials required :

Goat's meat	–	1 kg
Sesame	–	¼ kg
Black gram	–	¼ kg
Cow's milk	-	1litre

The goat's meat should be washed properly and put in 5 litres of water and boiled till it reduces to half the quantity. After this the flesh should be removed and the extract alone should be filtered. Black gram and seasame should be properly powdered. The mixture of these powders should be mixed with the meat extract after it is cooled. After mixing this it should again be boiled. After boiling the mixture is cooled and then milk should be added. This should now be transferred to a mud pot. The mouth of the mud pot should be tied with a cloth. The pot should be buried under the ground or under the compost pit. The extract should be mixed well at least once a day.

After 10 days the extract should be removed and properly filtered. It should be transferred to another pot and closed. Fermentation takes place during this period.

This extract (*kunapajala*) can be applied near the roots or used as a spray. For application near the root zone 3 litres of growth regulator is required. This should be applied near the irrigation channel so as to mix with the water.

500 ml of extract should be mixed with 10 litres of water for use as a foliar spray. This is sprayed twice during the vegetative stage. By using this there is an increase in the number of grains per ear head and also a general increase in the yield. The weight of the grains also increase.

After irrigating the field in which the seedlings are transplanted the growth regulator can also be applied using a hand sprayer on the surface of the water.

6. Use of Panchagavya for Paddy

Panchagavya is a combination of 5 products obtained from the cow which is used in traditional medicine extensively. These are cowdung, cow's urine, cow's milk, curd and ghee. This is also mentioned in *vrkshayurveda* texts and it has been experimented by us and other farmers. It has a significant role in providing resistance to disease, pests and increasing the overall yield.

Note : The *panchagavya* preparations mentioned here are slightly different from what has been mentioned in the *vrkshayurveda* texts. These modified versions have been standarised by experimental trials.

Materials required

1.	Cowdung mixed with water	– 500 ml.
2.	Cow's urine	– 300 ml.
3.	Cow's milk	– 200 ml.
4.	Curd	– 200 ml.
5.	Ghee	– 100 ml.
6.	Yellow plantain	– 2 nos.
7.	Coconut water	– 300 ml
	Total	1500 ml.

Preparation

All the products mentioned above should be put in a mud pot, mixed properly and kept open for 10 days. It should be mixed every day. It is ready for use in 10 days time. This preparation is based on the method followed by Dr. K. Natarjan of Kodumudi.

The methods of use of *panchagavya* for specific conditions are described in the next few pages.

Panchagavya for Leaf blight treatment

Symptoms of Bacterial leaf blight disease

It is characterized by the appearance of yellow colour water soaked lesions on both the edges of the leaves. Later they coalesce and the entire surface turns into straw colour. The affected leaves roll completely, droop and ultimately the tillers wither away. These symptoms usually appear 4 to 6 weeks after transplanting. Affected plants produce chaffy grains.

Treatment

A 5% panchakavya extract is sprayed on the paddy crop when bacterial leaf blight symptoms are noted. Within 1 week the bacterial leaf blight symptoms disappear completely. For preparation of 5% extract one should use 50 ml. of the panchavkaya prepared for 1 litre of water.

Use of Panchakavya in Other crops

When a 3% panchakavya was sprayed on chilli crop within 10 days of spraying it became dark green. In the case of lemon a 3% panchakavya was sprayed during the vegetative stage and the flowering stage. This gave increased yield.

Experiences of a farmer using Panchakavya for rice cultivation

Given below is the experience of a farmer who had used panchakavya for rice cultivation. He had cultivated the indigenous variety *kitchili samba*. This is a traditional rice variety popular for its use in the South Indian meal and also for making a special dish "biriyani". Sri. Gomathynayagam of Vivasaya Seva Sangam, Puliyangudi, Tirunelveli Dist. obtained seeds of this variety from CIKS and cultivated it during the samba season (Aug. - Dec.)

of the year 2000. He raised the seedling for one acre using 40 kgs of seeds. The seedlings were transplanted on the 30th day. He used 40 loads of farmyard manure while preparing the main field. Before transplantation he irrigated the main field with dilute slurry. On the 25th day after transplantation he irrigated the field with cowdung solution. On the 30th day a litre of cow's urine diluted in 10 litres of water was sprayed. On the 40th day he sprayed *panchagavya* using a power sprayer. Only one weeding was done.

Preparation of Panchagavya

For preparing panchagavya Sri Gomathynayagam had taken 5 litres of slurry, 3 litres of cow's urine, 2 litres of cow's milk, 2 litres of curd prepared from cow's milk and 1 litre of ghee. All these were put in a wide mouthed vessel and left in a shady place. The solution was mixed with hand everyday in the morning and evening. The panchagavya is ready on the 9th day and can be used for the next 30 days. Since ghee does not dissolve easily he used a power sprayer. 3 litres of *panchagavya* was diluted with 100 litres of water and sprayed. After spraying *panchagavya* on the 40th day after transplantation he irrigated the field. 130 days after transplantion the crop was ready for harvest. He got an yield of 1400 kg of paddy.

According to Sri Gomathynayagam this variety was easy to cultivate and tasty to eat. It was extremely good for preparing pongal and pepper rice. Sri Gomathynayagam mentions that the yield could be increased over a period of time by increasing the soil fertility gradually. He plans to distribute seeds of this variety to others in his area. He suggests that to preserve the soil quality and the environment it is better to cultivate such varieties organically.

Are the Prescriptions of Vrkshayurveda Exotic and Expensive?

At first glance, a reader may wonder if the prescriptions of *vrkshayurveda* are exotic and expensive. The frequent mention of ingredients like honey, ghee and milk may also make one wonder if these are practical. We can, however, assure the reader that there are indeed a large number of recipes that are easy to put to practical use. Even in cases where relatively expensive ingredients are specified, they are often in quantities that make the effort entirely worthwhile.

Here is the response of a reader K.K. Somani published in a journal called Jeevaniya. This was in response to a reference made by another reader that vrkshayurveda recipes are expensive.

"I had some trees of "sitaphal" (Custard apple) at our Nashik farm which were not yielding any fruit for 15 years. The fruit would form but would drop off only after a small growth and this was in spite of using fertilizers and full irrigation.

After reading vrkshayurveda, I applied about 1 kg milk together with various pulses, ghee and honey, all together costing less than Rs.50/- only once in the last winter of 1994. Within three months, I got a record crop of sitaphals which were also extremely delicious.

In the second instance, I had ordered some small plants of fruit trees from Delhi for plantation at Nashik. Out of 20 plants, about four plants (3 to 4 days after reaching Nashik) started drying and dying. I immediately applied on the entire plant the above mix of milk, honey and ghee with various pulses and replanted the same. Not only did the small plants come alive again in just 15 days but started growing with new leaves without further damage. The cost of this treatment was less than Rs.10/- per plant. It can be seen therefore that the cost of treatment is not high nor is it irrelevant today in spite of all the progress of our so-called science. I am sure that the various diseases of plants which are treated by pesticides can be more conveniently and less expensively treated with what has been suggested in vrkshayurveda."

Chapter - 4

Conclusion

In this booklet, we have made a beginning in terms of understanding the principles of *vrkshayurveda* and applying them practically to the field situation, particularly for the rice crop. We have also made an attempt to comprehend the rationale or theory behind certain traditional practices based on the principles of *vrkshayurveda*. Testing out the recipes of *vrkshayurveda* has presented a large number of problems. For example, quite often the texts do not give a very detailed description in terms of the relative proportions of the components or even the precise manner in which the treatment has to be carried out. This would not pose a problem in a text of *ayurveda* which has a large number of practitioners as well as scholars since there are not only specific conventions on this matter but also practitioners who will be using the recipes constantly to give guidance to somebody who wants to make use of prescriptions practically.

We are faced with the fact that in the case of *vrkshayurveda*, while there are a large number of texts and recipes there is nothing in the nature of a - "scholarly tradition". For example, a text may state that we should soak seeds in milk before sowing. However, while we translate this into practice, we have to face questions such as -

- What is the source of milk to be used ? (in some cases this may be mentioned).
- Should the milk be boiled or used raw ?
- How long should it be soaked in milk ?
- If the soaking is for a long period then should it be dried intermittently ?

Hence, to arrive at a practical prescription we may have to test out each of the above questions through practical experiments. The situation is in reality much more complex since several recipes of *vrkshayurveda* mention procedures that involve a large number of components or several steps - in such cases there are uncertainties in each step. The problem in our case is multiplied several fold since we are dealing with the paddy crop. This is not a short duration plant and if an experiment is to take a look at the growth or yield we would need anywhere from 3 - 6 months for a single trial. Ideally we would like to try something for at least 2 or 3 crop seasons before we feel that the procedure has been standardized. Further, there are several paddy varieties which vary from each other in terms of - age, suitability to climatic conditions, type of soil required etc. and ideally tests must be repeated with the same variety and also in the similar crop season. For example, if a test is made with a particular variety in Tamil Nadu in the crop season where we get it sown in the Tamil month of *adi* (mid July - mid August), the results would be obtained only the following year in January / February. If we are to repeat this trial, then ideally one should carry out the repetition by sowing in *adi* in the subsequent year to make the conditions comparable.

All this means that, in these trials and experiments, we have only made a beginning and we have to travel a long path before we can produce satisfactory prescriptions starting from a textual reference.

Future Prospects

Nevertheless, we have been encouraged by the results obtained thus far and we feel that there is a lot of scope for further research and the prospects are bright. Methods drawn from *vrkshayurveda* can constitute a valuable starting point in three different ways -

1. Techniques that are already in use by farmers can be examined rigorously in the field as well as analysed in the light of *ayurvedic* theory.

2. Using the principles and theories of *ayurveda*, one can extend the use of currently available and used material to new situations and problems.

3. Finally it seems possible that one can come up with a line of treatment for various 'new' pest and disease conditions (i.e. hitherto not described in the literature on *vrkshayurveda*) starting from the basic principles and theories of *vrkshayurveda*.

Appendix - I

Resource Books on *Vrkshayurveda*

Upavana Vinoda

The *Upavana Vinoda* is a chapter in *Sarangadhara's* encyclopaedic work, "*Sarangadhara Paddhati*", which is an anthology compiled by *Sarangadhara*. It deals with a variety of subjects like asceticism, medicine, politics, economics, botany, philosophy etc. It almost covers the whole of human life in its most general as well as its deeper aspects. The author of this treatise *Sarangadhara* was a courtier of King Hammira of *Sakambari Desa* (Bundelkhand) and lived in the 13th century A.D. (1283 – 1301). *Upavana Vinoda* deals with topics such as (i) glory of trees (ii) selection of soils for planting various trees (iii) classification of plants (iv) the process involved in sowing of seeds and planting (v) watering (vi) examination of soils where wells are to be dug (vii) rules for the nourishment of the plants (viii) pest and disease management and (ix) botanical marvels.

Brihat Samhitha

Brihat Samhitha is a treatise in sanskrit compiled by *Varahamihira* in 500 A.D. *Varahamihira's* patron King was Harsha Vikramaditya of Ujjain who lived in the 6th century A.D. This text deals mainly with astrology but also discusses topics like rain clouds, science of plants and plant life, winds, indication of yield of crops from the blooming of flowers, vegetable horoscopy, ascertaining presence of water in a dry region, architecture etc.

Vrkshayurveda of Surapala

Vrkshayurveda of Suraphala is a manuscript on horticulture and botany and contains an interesting account of the preparation of different kinds of manures and also recommends the kind of manure which should be applied to various crops, trees and plants. It also talks about plant diseases and their treatment.

Krishi Sukthi

Krishi Sukthi is a Sanskrit work on agriculture which is narrated by the sage *Kashyapa*. It is arranged in four parts and it contains the description and methodology of paddy cultivation, growing of vegetables, description of the order of eatables and uneatable substances and the description of the rules containing information about the various oblations. The date of the work in its present form is uncertain. But there is a good reason to date the core of the work to the 8 – 9th century A.D. The text most probably belongs to the *Vaishnava* tradition of South India more exactly to the school of *Vaikhanasas*. *Kashyapa* as an authority on agriculture is mentioned by *Bhattotpala* in his commentry on *Brihat Samhitha*.

Amarakosha

Amarakosha is a Sanskrit lexicon (6th Century A.D.) compiled by pandit *Amarasimha* and is also called as *Namalinganusasana*. The book comprises of three parts or *khandas* and is also called as *Trikandakosha*. Since it deals with the language sanskrit called as *Devabhasha* (celestial language) it is also called as *Devakosha* and is well known among the sanskrit literary works. The first and second part or *khanda* consist of ten chapters or *vargas* each and the third part of *khanda* has only six chapters or *vargas*. The importance of this book is that it mentions both *paryaya shabdha* (synonyms) and *nanartha shabdhas* (different meanings of the words). Chapters like *bhoomi varga, vanoushadhi varga* and *vaisya varga* give a comprehensive glimpse of the art of classification of soil, land, implements used etc.

Krishiparasara

Krishiparasara is a sanskrit work attributed to sage *Parasara* devoted exclusively to the different agricultural operations. It is difficult to determine authoritatively the date of this work. *Krishiparasara* may have been written in the period between 950 – 1100 A.D. It is difficult to ascertain exactly the part of the country to which the author belonged. The most remarkable feature of this work is that it considers agriculture as depending merely on rainfall – "*Vristi mula krishi sarva*". There are mentions of signs of immediate rainfall such as rising of ants from their holes, sudden croaking of frogs as well as particular position of the sun, moon and other planets. Regarding seed collection, preservation and sowing, detailed rules and methodology which is of a great practical value are mentioned in this work.

Dhanvantri Nighantu

This work in Sanskrit is a materia medica compiled in the 11th Century A.D. There is no clear mention or reference to the author of this work. In this work 373 *Dravyas* are explained under seven *ganas* or groups namely (i) *Guduchyadi* (ii) *Shatapushpadi* (iii) *Chandanadi* (iv) *Karaveeradhi* (v) *Aamradi* (vi) *Suvarnadi* and (vii) *Misrakadi.* The author of this work says that for the better understanding of the plants in the forest etc. the physician should get the help of people living in the forest, local folk and tribes.

Raaja Nighantu

This book in sanskrit is a materia medica compiled in the 11th Century A.D. and is also called as *Nighantu Raaja* and *Abhidana Choodamani.* The author of this work is Pandit *Narahari* who was the son of *Eswarisuri* who lived in Kashmir. The work is compiled by refering books like *Dhanvantri nighantu, Madhanapala nighantu, Amarakosha* etc. Drugs like *sarpakshara, karpoora thaila* etc. which are not found in books like *Bhava prakasha* are found in this work. The *dravyas* mentioned in this work are grouped in twenty three *vargas* based on principles like *roodhi, prabhava, aakrithi, upama, deshyokthi, veerya* and *utpathisthana.*

Bhava Prakasha Nighantu

This is a standard book of materia medica in *Ayurveda* written by *Bhava Misra* of Bengal in the 16th century A.D. The speciality of this work is that the auhor has discussed plants like *pudina (*mint), *aalukam* (potato) and *garijara* (carrot) which are of recent origin. He has also given a detailed description of qualities of soil, their types and suitability to particular crops and also the particular part of a plant to be used for specific purposes. He was also the first to introduce Unani medicine. He is also known to have served as a physician in Akbar's court.

Note : Some standard editions of the above texts are listed below.

1. *Vrkshayurveda* of *Surapala,* manuscript available in Bodleian Library, Oxford University, Oxford No.324 B (Ms. Walkar 137), Oxford, London.

2. *Upavana Vinoda* of *Sarangadhara,* English translation by G.P. Majumdar, published by Satis Chandra Seal for The Indian Research Institute, Calcutta, 1935.

3. *Brihat Samhitha* of *Varahamihira,* English translation by M. Ramakrishna Bhat, published by Motilal Banarasidass, 1987.

4. *Amarakosha* of *Amarasimha,* Edited with Hindi commentary and notes by Pandit Haragovinda Sastri, published by Chaukhamba Sanskrit Sansthan, Varanasi, 1982.

5. *Krishiparasara* of *Parasara,* Edited and translated by Girija Prasanna Majumdar and Suresh Chandra Banerji, published by Asiatic Society, Calcutta, 1960.

6. *Raaja Nighantu* and *Dhanvantri Nighantu,* Edited by Vaidya Narayana Sharma, printed and published by Anandashram Press, Pune, 1986.

7. *Krishisukti* of *Kashyapa,* Edited and translated into English by Gyula Wojtilla, published by Acta Orientalia Academiae Scientiarum, Budapest, Hungary, 1985.

Appendix - II

Guna : Ayurvedic Properties

There is a wealth of information available in the texts of *ayurveda* and the medical lexicons regarding properties of plants (and also substance of animal or mineral origin). However, these properties are given in *ayurvedic* terms and this is a language and terminology that is different from what one would find in modern texts where properties of substances may be described in terms of chemical composition. Some of the factors based on which *ayurvedic* texts describes the nature of a substance are - rasa or taste, guna or property etc. For example, if one takes the term guna, there are about twenty Gunas occuring in ten pairs which are freqently used to describe properties of substances. These are listed below -

1.	Guru (heavy)	Laghu (light)
2.	Manda (slow)	Tikshna (sharp)
3.	Sheetha (cold)	Ushna (hot)
4.	Snigdha (unctuous)	Rooksha (dry)
5.	Slakshana (smooth)	Khara (rough)
6.	Saandra (viscous)	Drava (liquid)
7.	Mrudu (soft)	Katina (hard)
8.	Sthira (stable)	Sara (unstable/moving)
9.	Sookshma (subtle)	Sthoola (gross)
10.	Vishada (clear)	Picchila (slimy)

For example, let us take the first pair, *Guru / Laghu*. *Guru* literally means heavy and in this context it means substances that are heavy to digest. These usually have an effect of increasing the bulk or weight of the body. As against this, substances that are *lagu* are light to digest. Typically, oils are *Guru* / heavy and something like puffed rice is laghu or light. Similarly, consider the pair, *sheetha / ushna*. *Sheetha* means that which is cooling to the body (of humans, animals or plants) and Ushna means that which is producing heat. This is understood not in the sense of increase of body temperature but the sensation of heat as we experience it. For example, unripe mangoes are considered *ushna* - that is they increase body heat. Hence, we are advised that if we eat a lot of such mangoes, it would be a good idea to drink milk (which has a cooling effect) so as to maintain the balance. The plant which is suffering from excess of *pitta* may be treated by irrigating it with substances that are *sheetha* or cool in potency such as sweet liquorice (*Glycyrrhiza glabra*).

Appendix - III

Ayurvedic Classification of Drugs Based on Therapeutic Action

In *ayurveda*, plants are grouped according to their pharamacological actions. The two major classics of *ayurveda*, namely - *Charaka Samhitha* and *Sushrutha Samhitha* have classified plants based on pharmacological actions. There is only a slight difference in the methods of classification. *Charaka* has classified plants into fifty groups according to the action on the body such as vitalising, bulk promoting etc. Each of these groups contain ten plants and is termed as *mahakashaayas*. *Sushrutha* has grouped plants into thirty eight groups (two groups, namely *ushakadi* and *trapwadi* consist of minerals) and are termed as ganas. These ganas are named according to the primary drug or first drug in the group. Sushrutha has grouped them according to their specific action on the doshas, diseases and for some other particular functions.

Charakas's Classification

Given below are a few of the fifty ganas listed by Charaka, along with the approximate english translation. An example in each case is also cited.

1. *Jeevaneeya* - Vitaliser
   eg. Jivaka (*Microstylis wallichii*)

2. *Brimhaneeya* - Bulk promoting
   eg. Aswagandha (*Withania somnifera*)

3. *Lekhaneeya* - Emaciating
   eg. Musta (*Cyperus rotundus*)

4. *Bhedaneeya* - Scabula breaking
   eg. Arka (*Calotropis gigantea*)

5. *Sandhaaneeya* - Healing
   eg. Priyangu (*Calicarpa macrophylla*)

Sushrutha's Classification

Here we have listed a few of the categories of Sushrutha with a description of each type and also given the Latin name of the lead entry. The name of each gana is derived from the sanskrit name of the lead plant of the gana (eg.) *Aaragwadha* or *Cassia fistula* is the lead plant of the *aaragwadhadi gana.*

1. *Vidaarigandhaadi* - reduces *pitta*, *vaatha*; tumour of Vaathic type, emaciation, lassitude, dyspnoea, cough (*Vidarigandha* - *Desmondium gangetium*).

2. *Aaragvadhaadi* - reduces *kapha*; poison, diabetes, skin diseases, fever, vomitting, ulcers (*aragvadha* - *Cassia fistula*).

3. *Rodhraadi* - reduces *kapha meda*; uterine disorders, astringent, anti-poison, promotive of complexion (Rodhra - *Symplocos racemosa*)

4. *Arkaadi* - reduces *kapha, meda*; worms, skin diseases, ulcers (Arka - *Calatropis gigantea*)

5. *Surasaadi* - reduces *kapha*; worms, respiratory diseases, anorexia (Surasa - *Ocimum sanctum*).

Appendix - IV

Table of Plant Names

Note : This table gives the Sanskrit names and Latin names (systematic botanical name) corresponding to the common name of the plants. Wherever the common name in English is not available it has been given in an Indian language. [(S) - Sanskrit, (T) Tamil]

Common/English Name	Sankrit Name	Botanical Name
Asafoetida	Hing	*Ferula asafoetida*
Ash gourd	Kusumandah	*Benincasa hispida*
Atis root	Ativisha	*Aconitum heterophyllum*
Bael tree	Vilvah	*Aegle marmelos*
Barley	Jav, Jau	*Hordeum vulgare*
Belleric myrobalan	Vibhitakah	*Terminalia bellerica*
Black catechu	-	-
Castor	Eranda	*Ricinus communis*
Chebulic myrobalan	Haritaki	*Terminalia chebula*
Chunga	Lodhra	*Symplocos cochinchinensis*
Common Milk hedge	Snuhi	*Euphorbia ligularia*
Coomb teak	Gambhari	*Gmelina arborea*
Country fig or Gular fig	Udumbara	*Ficus racemosa*
Cutch tree	Kadhira	*Acacia catechu*

Deodar or Himalayan cedar	Devadaru	*Cedrus deodara*
Devil tree	Saptaparna	*Alstonia scholaris*
Dill	Satapuspa	*Anethum graveolens*
Edible - stemmed vine or Adamant creeper	Hadjod, Hadjora	*Cissus quadrangularis*
Embelia	Vidanga	*Embelia ribes*
Fennel	Saumph	*Foeniculum vulgare*
Five leaved chaste tree	Nirgundi	*Vitex negundo*
Gigantic swallow work	Arkah	*Calotropis gigantea*
Greater galangal	Rasna	*Alpinia galanga*
Ground nut	Bhucanakah	*Arachis hypogea*
Indian bdellium tree	Guggulu	*Commiphora mukul*
Indian beech	Karajah	*Pongamia pinnata*
Indian Gooseberry	Amlaki	*Phyllanthus emblica*
Indian Laburnum	Aragvadha	*Cassia fistula*
Indian mustard	Sarsapah	*Brassica juncea*
Indian trumpet tree	Syonakah	*Oroxylum indicum*
Jeevak	Jivaka	*Microstylis wallichii*
Karumarudu (T)	-	*Terminalia tomentosa*
Khas-khas	Usira	*Vettiveria zizanioides*
Long pepper	Pippali	*Piper longum*
Mahua	Madhuka	*Madhuca indica*
Marking nut tree or oriental cashew	Ballataka	*Semicarpus anacardium*
Mesua, Iron-wood tree	Naga kesara	*Mesua nagassarium*

Mint	Pudhina	*Mentha arvensis*
Munnai (T)	Agni Mandam	-
Nali (S)		*Hibiscus cannabinus*
Neem	Nimba	*Azadirachta indica*
Nut grass	Musta, mustaka	*Cyperus rotundus*
Pilklan (S)	-	*Ficus arnottiana*
Priyangu (S)	-	*Calicarpa macrophylla*
Rodhra (S)	-	*Symplocos racemosa*
Rohituka tree	Rohitaka	*Aphanamixis polystachya*
Rosha grass/Rusa grass	Dhyamakah	*Cymbopogon martinii*
Sacred Basil	Surasa	*Ocimum sanctum*
Sahacara (S)	-	*Barleria prionitis*
Sandal wood	Chandana	*Santalum album*
Seasame, Gingelly	Til	*Sesamum indicum*
Shoe flower	Japa	*Hibscus rosa-sinensis*
Sweet flag	Vacha	*Acorus calamus*
Sweet liquorice	Yastimadhuh	*Glycyrrhiza glabra*
Trumpet flower tree	Patala	*Stereospermum colais*
Vidarigandha (S)	-	*Desmodium gangeticum*
Wild Asparagus	Satavar	*Asparagus racemosus*
Winter cherry	Ashvagandha	*Withania somnifera*
Yellow berried nightshade	Kanthakari	*Solanum surratense*

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